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Susan Xu

PATENT

In re application of: **REZVANI et. al.**
Application No.: **09/776,067**
Filed: 2/02/2001
Title: **METHOD & APPARATUS FOR AN X-DSL MODEM SUPPORTING MULTIPLE X-DSL LINE CODES**

Attorney Docket No.: **VELCP001X3**

Examiner: **N/A**

Group: **2661**

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Madame/Sir:

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Before examination, please amend this application as follows.
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IN THE CLAIMS:

Please cancel Claim 1 and add new Claims 2-21.

2. (New) An X-DSL modem comprising:

a coder for coding digital data in at least a discrete multi-tone (DMT) line code and a carrierless AM/PM (CAP) line code and vice-versa;

a Fourier transform engine coupled to the coder and operating as a base band-to-carrier band converter and vice versa for the digital data encoded in the DMT line code and as a filter for the digital data encoded with the CAP line code;

a converter coupled to the Fourier transform engine for converting between base band-to-carrier band and vice-versa digital data in the CAP line code; and

an analog portion coupled to the converter for converting the digital data in the DMT line code and the CAP line code to an analog transmission and vice versa.

3. (New) The X-DSL modem of Claim 2, wherein the coder further comprises:

an encoder on a transmit path for encoding the digital data; and

a decoder on a receive path for decoding the digital data.

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4. (New) The X-DSL modem of Claim 2, wherein the converter further comprises:

an upconverter switchably coupled to a transmit path for base band-to-carrier band conversion of the digital data in a CAP line code; and

a downconverter switchably coupled to a receive path for carrier band-to-base band conversion of the digital data in a CAP/QAM line code.

5. (New) The X-DSL modem of Claim 2, further comprising:

a gain scaler on a transmit path of the modem for scaling of DMT sub-symbols associated with each DMT symbol expressed within the digital data in the DMT line code, and for scaling of a set of CAP symbols expressed within the digital data in the CAP line code; and

the Fourier transform engine converting on the transmit path the scaled DMT sub-symbols supplied by the gain scaler for digital data in the DMT line code from base-band-to carrier band; and the Fourier transform engine filtering in a frequency domain the set of scaled CAP symbols supplied by the gain scaler.

6. (New) The X-DSL modem of Claim 2, further comprising:

a frequency domain equalizer (FEQ) on a receive path of the modem for time domain equalization (TEQ) of DMT sub-symbols associated with each DMT symbol expressed within the digital data in the DMT line code, and for supplying filter coefficients for filtering a set of CAP symbols expressed within the digital data in the CAP line code; and

the Fourier transform engine converting on the receive path the digital data in the DMT line code from carrier band-to-base band; and the Fourier transform engine filtering in a frequency domain the set of CAP symbols with the filter coefficients supplied by the FEQ.

7. (New) The X-DSL modem of Claim 2, further comprising:

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a plurality of buffers located throughout the transmit path and receive path between selected ones of: the coder, the Fourier transform engine, the converter and the analog portion; for buffering a plurality of communication channels for pipelined processing of said channels.

8. (New) The X-DSL modem of Claim 7, wherein the communication channels exhibit a plurality of X-DSL line codes including: a DMT line code and a CAP line code.

9. (New) The X-DSL modem of Claim 7, wherein the communication channels exhibit a plurality of X-DSL protocols.

10. (New) A method for X-DSL communication comprising:
coding digital data in at least a discrete multi-tone (DMT) line code and a carrierless AM/PM (CAP) line code and vice-versa;
transforming from a base band-to-carrier band and vice versa the digital data encoded in the DMT line code;
filtering the digital data encoded with the CAP line code;
converting between base band-to-carrier band and vice-versa digital data in the CAP line code; and
converting the digital data in the DMT line code and the CAP line code to an analog transmission and vice versa.

11. (New) The method of Claim 10, wherein the coding act comprises:
encoding the digital data on a transmit path; and
decoding the digital data on a receive path.

12. (New) The method of Claim 10, wherein the first converting act further comprises:
upconverting digital data on a transmit path from carrier-to-carrier band; and
downconverting digital data on a receive path from carrier band-to-base band.

13. (New) The method of Claim 10, wherein the transforming act further comprises:
scaling on a transmit path DMT sub-symbols associated with each DMT symbol expressed within the digital data in the DMT line code; and

scaling on the transmit path a set of CAP symbols expressed within the digital data in the CAP line code;

converting on the transmit path the scaled DMT sub-symbols scaled in the first scaling act from base band-to carrier band; and

filtering in a frequency domain the set of scaled CAP symbols scaled in the second scaling act.

14. (New) The method of Claim 10, wherein the transforming act further comprises:
- equalizing in a time domain on a receive path DMT sub-symbols associated with each DMT symbol expressed within the digital data in the DMT line code, and
 - supplying filter coefficients for filtering a set of CAP symbols expressed within the digital data in the CAP line code;
 - converting on the receive path the digital data in the DMT line code from carrier band-to-base band; and
 - filtering in a frequency domain the set of CAP symbols with the filter coefficients supplied in said supplying act.

15. (New) The method of Claim 10, further comprising the act of:
- buffering digital data processed in selected ones of: the coding act, the transforming act, the filtering act, the first converting act, and the second converting act; to effect a pipelined processing of a plurality of communication channels.

16. (New) The method of Claim 15, wherein the plurality of communication channels buffered in the buffering act exhibit a plurality of X-DSL line codes including: a DMT line code and a CAP line code.

17. (New) The method of Claim 15, wherein the plurality of communication channels buffered in the buffering act exhibit a plurality of X-DSL protocols.

18. (New) A means for X-DSL communication comprising;
- means for encoding on a transmit path and decoding on a receive path digital data in at least a discrete multi-tone (DMT) line code and a carrierless AM/PM (CAP) line code;

means for transforming on the transmit path digital data encoded in the DMT line code from base band-to-carrier band and vice versa on the receive path,

means for filtering on the transmit path and the receive path digital data encoded with the CAP line code;

means for converting on the transmit path digital data encoded in the CAP line code between carrier-to-carrier band and vice-versa on the receive path; and

means for converting on the transmit path the digital data in the DMT line code and the CAP line code to an analog transmission and vice versa on the receive path.

19. (New) The means for X-DSL communication of Claim 18, comprising:

means for encoding on a transmit path the digital data; and

means for decoding on a receive path the digital data.

20. (New) The means for X-DSL communication of Claim 18, comprising:

means for upconverting on the transmit path digital data in a CAP line code from base band-to-carrier band; and

means for downconverting on a receive path digital data in the CAP line code from carrier band-to-base band.

21. (New) The means for X-DSL communication of Claim 18, comprising:

means for buffering digital data processed in selected ones of the means for encoding, means for transforming, means for filtering, the first means for converting and the second means for converting; to effect a pipelined processing of a plurality of communication channels.

REMARKS

Applicant preliminarily amends the original claims as filed with the cancellation of Claim 1 and the addition of new claims 2-21. Support for the amended claims can be found throughout the Specification.

Entry of the proposed preliminary amendment is respectfully requested. Attached hereto is a marked-up version of the changes made to claims by the current amendment. The

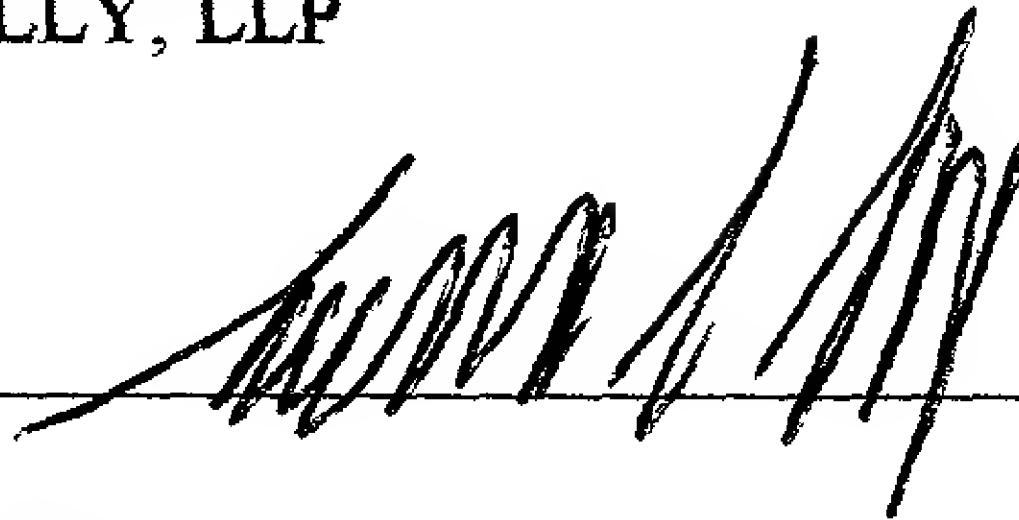
attached page is captioned "Version with marking to show changes made." Favorable consideration is respectfully solicited.

Respectfully submitted,

CARY & KELLY, LLP

Date: June 28, 2001

Signed: _____



Charles C. Cary

Registration No. 36,764

CARY & KELLY, LLP
1875 Charleston Road
Mountain View, California 94043
Telephone: 650.533.4844
Fax: 650.316.4013

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In the Claims:

Claim 1 has been cancelled. New Claims 2-21 have been added.